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ABSTRACT

The influence of sex-role identity on academic achievement behaviors and attitudes is just beginning to be understood. This paper examines two subject areas, mathematics and English, which have traditionally been sex-typed as male and female domains, respectively. Two mechanisms by which sex-role identity may affect achievement behaviors--value of task and self-perceptions--are also explored. The instrument used in this study includes a list of activities shown to be sex-typed. The respondents rated these activities as to their importance for girls and boys. The ratings were used to assess the degree to which students stereotype the activities of boys and girls. Results showed boys as expressing more stereotypical views in general. As for the effect of sex-role identity on achievement attitudes, it was greatest for girls on their attitudes toward math; for boys toward both math and English. The androgynous personality seemed to have the most positive attitudes toward math and English. (Author/GK)

SEX-ROLE IDENTITY, STEREOTYPES AND THEIR RELATIONSHIP TO ACHIEVEMENT ATTITUDES

by

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This paper was presented, in part, at the Biennial Meeting of the Society for Research in Child Development in Boston, and the Annual Meeting of the American Educational Research Association in Los Angeles, April 1981 as part of a symposium on "Sex Differences in Achievement Motivation: Where are We Now?" The research reported in this paper was supported by grants from the National Institute of Education (NIE-G-78-0022) and the National Institute of Mental Health (5R01-MH31724-01).

In the area of mathematics boys and girls perform equally well until adolescence when sex differences in math achievement begin to appear with boys performing better than girls (Aiken, 1976; Fennema & Sherman, 1977; Maccoby & Jacklin, 1974). Differences in course-taking appear when courses become elective. The discrepancies between the participation of males and females in mathematics and related fields increases as the level of education increases and results in the underrepresentation of women in many career areas (NCES, 1979). The sex differentiation of achievement in mathematics is mirrored in other academic areas. Maccoby and Jacklin's review (1974) of sex differences shows no consistent differences for males and females in overall achievement but does report sex differences within the specific areas of verbal ability and mathematic reasoning. Stein and Bailey (1975) conclude that areas of achievement are different for males and females, those chosen by females being less consistent with the areas traditionally linked with achievement.

One explanation for the observed sex difference in achievement offered by Stein and Bailey (1975) and others is that cultural definitions of sex-roles affect the achievement behaviors of both males and females in our society. Sex-role valuing is seen as a need or value system that might conflict with achievement striving. Farmer and Fyans (1980) see sex-role socialization as leading to certain psychological predispositions, such as risk preference, self-esteem and home-career conflict, which affect achievement attitudes and behaviors. The evidence of sex differences in career plans, self-esteem, and achievement motivation seems to lend support for this thesis but the link between sex-roles and these sex differences is just beginning to be empirically studied.

To better understand the influence of sex-role identity on academic achievement behaviors and attitudes I chose to look at two subject areas; mathematics and English, each traditionally sex-typed as male and female domains respectively (Stein & Bailey, 1973) and each a subject area in which sex differences in achievement have been observed. In addition I would like to explore two suggested mechanisms by which sex-role identity may affect achievement behaviors: the value of the task, and self-perceptions.

Sex-role socialization may cause you to value those tasks consistent with your role identity as well as those tasks which may further the achievement of future sex appropriate goals. Proponents of the cognitive-developmental model of sex-role acquisition (Kohlberg, 1969; Parsons, 1978) suggest that sex-roles influence behavior through the mediating role of incentive value. The value you place on an activity determines your choice of a task and subsequently your persistence and achievement in tasks

undertaken. In support of this view, several studies have documented the influence of sex labeling of tasks on performance and choice (Maccoby & Jacklin, 1974; Stein & Bailey, 1973; Wesley & Wesley, 1977). The research on sex-typing of activities shows that children learn, at an early age, which activities are appropriate to their sex and continue to choose sex appropriate activities even when this choice results in monetary loss (Bem, 1976; Connors & Serbin, 1977; Kagan, 1964). Bem reported subjects exhibiting a noticeable discomfort when forced to choose a cross-sex-typed activity. While these studies were conducted in the lab, the same effect of sex-typing activities could be expected in natural settings. The discomfort observed in the lab may translate into a similar psychological cost suffered by individuals who find themselves needing to choose sex inappropriate activities.

Sex-role orientation has also been shown to have an impact on life goals including career choices. Career plans could affect the utility value placed on academic achievement. Marini (1978) found that during adolescence, when girls become oriented toward relationships with boys and the role of wife and mother, they become less inclined to view higher education as important or realistic. During high school girls' educational aspirations tend to decrease while boys' aspirations increase. This conflict between family and career could also evidence itself through lack of specificity in career plans resulting in less realistic assessments of the utility of courses such as mathematics. Finally, sex-role orientation could effect the range of careers an individual would consider appropriate. The limiting of career goals would be reflected in an equally limited range of achievement areas seen as useful in attaining these goals.

The second mechanism by which sex-roles may affect achievement is through their effect on self-perceptions, particularly feelings of ability and competence. Since the female sex-role stereotype implies low competence in many areas, incorporation of this sex-role into one's self-concept may lead one to accept the stereotype as a valid perception of true ability differences (Stein & Bailey, 1973). Thus, young girls may come to believe they have lower ability and as a consequence, may develop lower expectancies for success. This link of sex-role identity to feelings of competence seems to be implied by the conceptualization of masculinity and femininity which focuses on the instrumental versus expressive aspects of the stereotyped masculine and feminine personality (Bem, 1976; Spence & Helmreich, 1978).

The strength of the effect of sex-role identity through both the mechanisms of task value and self-perceptions would depend on several conditions: how the individual defines

sex-role stereotypes, the individual's own sex-role identity, and the individual and situational salience of sex-roles. For sex-roles to affect achievement behaviors toward a specific task, the task must be recognized by the individual as sex-typed, the individual's sex-role identity must be in conflict with the stereotyping of the task, and the role identity must be important or salient. A female with a feminine role identity should have less positive attitudes toward a masculine labeled task such as math than toward a feminine labeled task such as English. The effect of role identity should be most important for the forming of attitudes for cross-sex-typed tasks. It is posited that the social and internalized sanctions to engage in sex appropriate and avoid sex inappropriate tasks are strong (Kagan, 1964; Wesley & Wesley, 1977). These pressures would make choosing a sex inappropriate task conflict-producing (Bem, 1976) and cause sex-role identity to be more salient. Choosing a sex appropriate task, on the other hand would produce no such conflict regardless of sex-role identity. Finally the notion of androgyny, which describes an individual who is comfortable with both masculine and feminine attributes, would suggest a person more flexible in the choice of tasks. An androgynous choice should be affected not by sex-typing of the task but situational variables such as past achievement, or relevance for future goals.

How sex-role identity is measured is important in the assessment of the true relationships between sex-role and achievement behaviors. The most widely used measures of sex-role orientation are the Bem Sex Role Inventory (BSRI) (Bem, 1974) and the Personal Attributes Questionnaire (PAQ) (Spence, Helmreich, & Stapp, 1974) both of which are based on personality characteristics stereotypically attributed to males and females. Both measures center about the instrumental versus expressive personality traits traditionally viewed as masculine and feminine respectively. These measures treat masculinity and femininity as distinct dimensions and allow for the categorization of individuals into masculine, feminine, androgynous, and undifferentiated personality types. While both of these measures have been shown to relate to achievement variables (Farmer & Fyans, 1980; Spence & Helmreich, 1978) the relationships are not consistent. What may be needed is a measure tied more closely to behavior variables and which assesses the salience of sex-role stereotyping for the individual.

The instrument used to test sex-role identity in this study was constructed with the above two objectives in mind. The instrument uses a list of activities shown to be sex-typed (Hartley, 1968). The respondent is asked to rate the importance of each activity for boys and girls. These ratings are used to assess the degree to which students stereotype the activities of boys and girls. Respondents

were also asked to indicate the frequency with which they engage in these same activities. These second responses can be used to measure how closely their own activities conform to their generalized stereotypes.

In summary, I suggest that the effect of sex-role identity on achievement is mediated by the effect of sex-roles on incentive value, utility, perceptions of ability, and expectancies for success. Futhermore, the relationship between sex-role and these attitudes will be strongest when sex-roles are salient for the individual, and when the task involved is sex inappropriate. Only the relationships between sex-role identity and these achievement attitudes are addressed in this paper. These relationships will be assessed using the PAQ as an established measure of sex-role identity and a new instrument which uses the ratings of sex-typed activities to measure sex-role identity and salience.

RESEARCH DESIGN AND METHODS

The study to be described here is a part of an extensive longitudinal and cross-sectional study. The goal of this study is the identification of the developmental origins and the relative importance of various factors which may mediate differential participation rates in mathematics by boys and girls. Data were collected at two points in time from students ranging in grade levels from 5th-12th.

Subjects

The study was conducted in two midwestern communities, one a university, professional community and the second a suburban community with a blue collar and young executive population. The schools selected within these communities have predominantly white middle class populations. Students were sampled from one high school in each community. Elementary and junior high schools were then chosen from schools which feed into these high schools.

The data reported here were collected in the first year of data collection within each community. The sample includes approximately 350 students from grade levels 5th to 11th inclusive, tested in the spring of 1978 in the first community. The second part of the sample consists of 850 students from grade levels 5th to 12th inclusive from the suburban community. These students were tested in the spring of 1979.

Instrumentation

Data were collected in several forms: student record data, a student questionnaire, a parent questionnaire, a teacher questionnaire, and classroom observations. Information taken from each student's school record included final grades in mathematics and English for the previous past two years and standardized achievement test scores. This paper will include only the student questionnaire data.

The student questionnaire included measures of expectancies for success, incentive values, perceived ability, and perceived task difficulty for both mathematics and English. Sex-role identity, sex stereotyping of math as a male domain, and perceived cost of success were also measured.

The variables relevant to this study are summarized in Tables 1 and 2. Each of the attitudinal variables is measured by a summary index of the questionnaire items listed. The items making up these indices each consist of the stem listed, followed by a 7 point Likert scale with endpoints labeled appropriately. Also listed are attitudinal constructs which were created by computing a mean of a set of scales measuring different aspects of a central concept.

To measure sex-role values two instruments were used. The first is an original measure of sex-roles which uses ratings of sex-typed activities. Students rated the importance of eight sex-typed behaviors for both boys and girls, and rated the frequency with which they engage in those activities. Originally twelve activities were chosen which were shown to be sex-typed (Hartley, 1968), were judged as relevant to contemporary students, and appropriate for the full range of ages included in our sample. Of these twelve, eight behaviors were chosen which were clearly sex-typed, four male stereotyped and four female stereotyped activities. The self-rating scale was given to all subjects in the first section of the questionnaire and the boy and girl activity rating scales were administered at the end of the second section of the questionnaire.

The second instrument is the Personality Attributes Questionnaire (PAQ) (Spence, Helmreich, and Stapp, 1974). The PAQ is a self-report measure containing a "masculinity" scale that taps instrumental personality traits and a "femininity" scale that taps expressive, interpersonal qualities. This scale was shortened and slightly modified for use with 5th through 8th graders and includes six masculine and six feminine items. Copies of the PAQ and the activities rating scales can be found in Appendix A.

RESULTS

Sex differences.

To assess the effects of sex-role identity on student attitudinal variables a "femininity" and "masculinity" score for each of the three sex-role measures was computed for each respondent. For each scale a masculinity and femininity score was constructed by computing a mean of the masculinity or femininity items respectively. As expected females scored higher on the PAQ femininity scores and males scored higher on the PAQ masculinity scores (t=9.01, p<.001; t=6.18, p<.001 respectively). The same was true for the self-rating on the activity scale with the expected sex differences in frequency of engaging in feminine activities and masculine activities (t=21.11, p<.001; t=15.03, p<.001 respectively). There were also sex differences in the importance boys and girls placed on students engaging in sex-typed activities. Boys felt it more important for either a girl or boy to engage in same-sex-typed activities than did girls (t=3.03, p<.01; t=2.75, p<.01 respectively). Table 3 presents the means for boys and girls on each of the rating scales.

Boys and girls differed in their attitudes toward both mathematics and English. Mean responses of boys and girls for both math and English are presented in Table 4. In general boys held more positive attitudes toward math than did girls. Boys perceived math as less difficult (t=3.93, p<.001), requiring less effort (t=3.78, p<.001) and less costly in terms of time and effort expended to do well (t=3.25, p<.01) than did girls. In addition, boys held higher expectancies for their success in math (t=3.66, p<.001), higher perceptions of their math ability (t=3.86, p<.001) than girls, and were more likely to see a difference between the math abilities of boys and girls (t=6.08, p=<.001). There were no sex differences in interest in math, perceived importance of math, or the perception of how "smart" one has to be to do well in mathematics. Both boys and girls rated math as more useful for men than for women but there was no sex difference in the perception of math as a male domain.

Attitudes toward English were consistently more positive for girls. Girls perceived English as less difficult (t=4.49, p=<.001) and requiring less effort (t=3.59, p=<.001) than did boys. In addition girls held higher expectancies for their success in English (t=3.78, p=<.001), higher perceptions of their English ability (t=3.13, p=<.01), and of their performance in English courses (t=4.07, p=<.001). Girls also were more interested in English (t=7.11, p<.001) and placed more importance on their English performance (t=5.02, p<.001) than did boys.

These results support a sex stereotyping view of math and English as male and female domains respectively. Boys saw math as less difficult and themselves as more able in math than did girls. Girls saw English as less difficult, more valuable, and themselves as more able in English than did boys. By looking at the mean responses of boys and girls on these measures it appears that the majority of shifts in sex differences is due to the differences of attitudes girls hold for math and English, while boys hold very similar views of both subjects. For example, boys' perceptions of task difficulty is nearly the same for math (mean=4.27) and English (mean=4.30) while girls' perceptions of task difficulty is much higher for math (mean=4.50) than for English (mean=3.89).

Sex-role identity.

To test for possible effects of sex-role identity, respondents were classified as a particular sex-role personality type by using the median-split method outlined by Spence, Helmreich, and Stapp (1974). This method was used to create personality classifications based on each of the four measures of sex-role identity: the modified PAQ, self rating on the activity scale, and idealized rating of both the boy and girl activity scales. For both the femininity and the masculinity scale on each of these measures, the sample was divided into high and low by cutting at the overall median. Each respondent was then classified into one of four categories for each of the four measures. Those who were low on both the femininity and masculinity components of a scale were classified as undifferentiated. Those high on the femininity score and low on the masculinity score were classified as feminine. Those low on the femininity score and high on the masculinity score were classified as masculine and those high on both scores were classified as androgynous.

Analyses of variance were then computed on each of the attitudinal variables with sex-role type as the independent variable. These analyses were done separately for each sex since it was believed the effect of sex-role classification would behave differently for each sex. The analyses were also done separately for the PAQ classification, activity self-rating, and the idealized same-sex rating. As can be seen by looking at Tables 5 and 6, the PAQ classifications seem to have significant effects on most of the attitudinal variables for both males and females. On the other hand, the activity rating scales have significant effects on fewer of the attitudes and have virtually no significance for female attitudes toward English.

First, I will summarize the results of the analyses of math attitudes on sex-role identity as defined by the PAQ. These results are presented in Table 5. For female

respondents, there were significant differences across sex-role classifications on most measures of attitudes toward mathematics. In general, females with androgynous or masculine sex-role identities seemed to have more positive attitudes toward math. They saw math as less difficult and less costly, held higher expectancies, perceived themselves as more math-able, as performing better in math, and being more interested in math than did females with feminine or undifferentiated sex-role identities. Exceptions to this pattern exist in perceived importance of math where androgynous personalities again show the highest rating but feminine personalities rate math as slightly more important than masculine personalities. This pattern is also true for ratings of how smart you have to be to do well in math. Sex-role types did not effect how girls stereotyped math as a male domain nor their stereotyping of math ability.

For males, the significant effects of sex-role identity as defined by the PAQ followed a more consistent pattern. For males, androgynous and masculine personalities had higher expectancies, higher perceptions of their ability and performance, reported more interest in math, and saw it as more important. There were no significant differences across sex-role types on ratings of the difficulty of math, the amount of effort math required, amount of intelligence math required, the stereotyping of math as a male domain, or the stereotyping of math ability.

The effect of PAQ sex-role classifications on attitudes toward English are similar and results are shown in Table 6. In general, for both males and females androgynous personalities have the most positive attitudes toward English and undifferentiated have the least positive attitudes. However, the differences between masculine and feminine personality types are smaller and less consistent than those observed in analyses of math attitudes. For females, feminine personality types see English as less difficult, hold higher expectancies, and higher estimates of their performance than do masculine personality types. These groups show no difference in their ratings of the importance of English, their interest in English, or their English abilities. For males, it is the androgynous and masculine personalities who have higher expectancies and higher perceptions of ability, but again there are no differences between feminine and masculine personality types on ratings of interest in or importance of English.

The results of analyses using the activity scale self-rating are problematic because of large differences in cell sizes. Activities chosen for this scale were clearly sex-typed and consequently more than 40% of both males and females classified themselves as sex-type appropriate while less than 10% of each sex was classified within the cross-sex category. While I felt it important to report the means

for each of the four classifications when significant sex-role identity effects occurred, caution should be taken when interpreting the mean responses of females classified as masculine and males classified as feminine since both of these groups have so few members.

For females, sex-role typing as measured by the activity scale had a significant effect on only four attitudes toward math. Females classified as feminine activity types had less interest in math, and valued math less than did females engaging in androgynous activities. Feminine activity types also rated math as requiring more intelligence and stereotyped it more strongly as a male domain than did androgynous types.

For males, those with masculine activity ratings saw math as less difficult and requiring less effort than did androgynous activity types. Masculine males also stereotyped boys as having more math ability than girls while androgynous males, on the average, saw no sex differences in ability. The significant effect of sex-role identity on cost of doing well, expectancies in math, perceptions of math ability, and interest in math seem to be mainly a result of the feminine males having much less positive attitudes toward math than males in all other categories.

The sex-role classification derived from the self ratings of activities had no significant effects on female attitudes toward English. For males, the only significant effect was on estimated performance in English where androgynous males had the highest rating and feminine males the lowest.

Finally, we look at the effect of same-sex ratings of the activity scales on attitudes toward math and English. These scales measure the degree to which the respondents stereotype the activities of their own sex. For girls, a feminine classification would indicate a sex stereotyped view of female activities; a masculine classification would indicate a cross-sex-typed view. Both androgynous and undifferentiated classifications indicate a lack of differentiation of masculine and feminine activities as important for females. Those classified as androgynous rated all activities as important while those classified as undifferentiated rated neither feminine nor masculine activities as very important. In this measure especially, the undifferentiated classification is probably best labeled low androgynous but for the sake of consistency I will continue to refer to it as undifferentiated.

Classifications of the ideal girl related to females' ratings of their math ability and the value of math. Females whose ideal was androgynous rated math as most

important and most valuable. Girls whose ideal was either androgynous or undifferentiated held higher expectancies and higher perceptions of their math ability than did girls who limited females to either masculine or feminine typed activities.

For males, those whose ideal boy was androgynous had the most positive attitudes toward math, highest expectancies, greatest interest, and placed the most importance on math. On the other hand, those who classified their ideal boy as undifferentiated had the least positive attitudes toward math; the lowest expectancies, least interest, and placed the least importance on math. Finally, males who limited boys to masculine-type activities also stereotyped males as having more math ability than females.

In attitudes toward English, the ratings of the ideal girl were significant only for the value of English. Here girls who classified their ideal as androgynous saw English as more valuable than girls who classified their ideal in any other group.

For boys, those who classified their ideal as androgynous or feminine had higher expectancies in English, higher estimates of their performance in English, higher perceptions of their English ability, and greater interest in English than did boys who classified the ideal boy as masculine or undifferentiated.

DISCUSSION

By virtue of the methods by which they were created, both measures of sex-role identity, the modified PAQ and the activity scales, tap sex differentiated personality traits or characteristics. The PAQ was constructed to measure the extent to which persons describe themselves as instrumental and expressive personalities. These two personality traits were chosen for study in part because males are on the average more instrumental and females more expressive. In a similar manner we constructed the activity scale to assure sex differences in the endorsement of different activities. The strength of the sex differences in activities engaged in is much greater than the sex differences observed for the PAQ. This may reflect stronger social sanctions against engaging in sex inappropriate activities than for exhibiting sex inappropriate personality traits.

Boys, when rating activities, expressed more stereotyped views both for themselves and for boys and girls in general. This was especially true of the low importance boys placed on boys or girls engaging in cross-sex-typed

[illegible] evident to the higher degree to which boys stereotyped math as a male ability.

The differences in the attitudes of boys and girls toward math and English suggest that these subjects are sex-typed to a certain extent. This is reflected in the ratings by both boys and girls that math is more useful for men than for women. Unfortunately, we do not have responses on similar stereotyping questions for English but the magnitude and consistency of sex differences in the attitudes toward English suggest it is viewed as a female domain.

The conclusions drawn concerning the effects of sex-role identity on attitudes toward math and English are dependent on how sex-role identity is measured. The effect of sex-role identity was most evident as measured by the PAQ but the effects were more scattered when using the activity ratings to measure sex-role.

When looking at the sex-role classifications defined by the PAQ, the androgynous personality held the most positive attitudes toward both math and English for both sexes. In addition, for both sexes the masculine or instrumental personality held the next most positive attitudes toward math. This is consistent with the view of math as a male domain. For English, females with androgynous or feminine expressive personalities report the most positive ability perceptions supporting the view of English as a female domain. However, males with the highest ability concepts in English are androgynous and masculine. Both masculine and feminine personality types show equal interest and value estimates of English. These inconsistencies may indicate either that English achievement is not clearly associated with sex-role identity in the minds of the subjects, or that achievement in English is not related to the particular dimensions of sex-role identity measured by the PAQ, i.e. instrumental and expressiveness or communion.

The self-ratings of the activity scales did not relate to attitudes toward English and only in a few isolated cases to math attitudes. As was mentioned before, this scale which asks respondents to indicate how often they engage in specific sex-typed and cross-sex-typed activities revealed much clearer discrimination of boys and girls than did other measures of sex-role identity. This is true, in part, because of the nature of the activities chosen to be included in this scale. However, it may also accurately reflect strong social pressure to conform to sex-role norms. I submit that these pressures to conform and the boundaries of sex-role appropriate activities are not as strong in academic pursuits, thus accounting for the lack of relationships between engaging in these non-academic activities with attitudes toward academic subjects.

[illegible] strong sense. Some may not be [illegible] person's self perception [illegible] sex-role identity.

The boy and girl ratings [illegible] same limitations as the self ratings since both used the same list of activities. However the ratings of the general girl or boy did relate to some of the attitudinal variables. For girls, the characterization of the ideal girl relates to their attitudes toward math but not English. It is girls who do not discriminate between male and female activities (i.e. whose ideal girl is undifferentiated or androgynous) who have the more positive attitudes toward math. For male respondents there are significant effects on both math and English attitudes. For math, males who characterize the ideal boy as androgynous have the most positive attitudes and those who characterize the ideal as undifferentiated the least positive. For attitudes toward English, males who characterize the ideal boy as masculine have the least positive attitudes including low estimates of ability and interest. This seems to suggest a stereotypical view that boys are general, and English as an achievement area.

In conclusion, sex-role identity does seem to have an effect on achievement attitudes. For girls, this effect is greatest on their attitudes toward math, particularly their interest in math and the degree to which they value math. For boys, sex-role identity effects their attitudes toward both math and English. The evidence does not support the theory that a feminine sex-role identity implies low competency in general. For girls in particular, a feminine sex-role identity corresponded to high expectancies and high perceptions of ability in English. But for both males and females, the androgynous personality seemed to have the most positive attitudes toward both math and English. Finally it seems clear that a better measure of sex-role identity is needed. A measure more closely linked to behaviors seems to more accurately measure male and female distinctions. A measure similar to the one used in this study with additions of intellectual activities may prove useful.

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Table 1

MATHEMATICS ATTITUDE SCALES INCLUDED IN THE STUDENT QUESTIONNAIRE

Current Difficulty in Math

6. How hard is math for you? (very easy/very hard)

21. Compared to most other students in your class, how hard is math for you? (much easier/much harder)

31. Compared to most other school subjects that you take, how hard is math for you? (my easiest course/my hardest course)

Effort Required To Do Well in Math

5. How hard do you have to try to get good grades in math? (a little/a lot)

36. How hard do you have to study for math tests to get a good grade? (a little/a lot)

42. To do well in math I have to work. . .
a) much harder in math than in other subjects, b) somewhat harder in math than... c) a little harder in math than... d) the same as in the other subjects, e) a little harder in other subjects than in math, f) somewhat harder in other subjects than... g) much harder in other subjects than in math.

67. How hard would you have to try to do well in an advanced high school math course? (not very hard/very hard)

Table 1 (continued)

Actual Effort/Effort Expended on Math

20. How hard do you try in math? (a little/a lot)

28. How much time do you spend on math homework? Check one.
a) an hour or more a day, b) 30 minutes a day, c) 15-30 minutes a day, d) about 1 hour a week, e) about 30 minutes a week, f) about 30 minutes every two weeks, g) I rarely do any math homework.

30. Compared to most other students you know, how much time do you have to spend working on your math assignments? (much less time than other students/a lot more time than other students)

Cost of Doing Well in Math*

57. How much does the amount of time you spend on math keep you from doing other things you would like to do? (takes away no time/takes away alot of time)

66. Is the amount of effort it will take to do well in advanced math courses worthwhile to you? (not very worthwhile/very worthwhile)

Perception of Task Difficulty*

Construct created by taking the mean of the following scales:

Current Difficulty in Math.

Effort to Do Well in Math.

Cost of Doing Well in Math.

Table 1 (continued)

Current Expectancies for Math

9. Compared to other students in your class, how well do you expect to do in mathematics this year? (much worse than other students/much better than other students)

54. How well do you expect to do on your next math test? (not at all well/very well)

63. How well do you think you will do in your math course this year? (very poorly/very well)

Perception of Math Ability

4. How good at math are you? (not at all good/very good)

19. If you were to order all the students in your math class from the worst to the best in math, where would you put yourself? (worst/best)

40. In comparison to most of your other academic subjects, how good are you in math? (much worse/much better)

Estimated Performance in Math

35. In math, most of the time, how well do you do in each of the following things?

35a. When the teacher calls on you for an answer in class. (very poorly/very well)

35b. When taking a test I have studied for very much. (very poorly/very well)

35c. When doing math homework problems. (very poorly/very well)

61. How have you been doing in math this year? (very poorly/very well)

Table 1 (continued)

Self Concept of Math Ability

Construct created by computing the mean of the following scales:

Current Expectancies in Math.

Future Expectancies in Math.

Perception of Math Ability.

Estimated Performance in Math.

Interest in Math

7. In general, I find working on math assignments...(boring/interesting)

15. In general, I find working on math games...(boring/interesting)

34. How much do you like doing math? (not very much/very much)

Importance of Math

25. I feel that, to me, being good at solving problems which involve math or reasoning mathematically is: (not at all important/very important)

37. How important is it to you to get good grades in math? (not at all important/very important)

43. How upset would you be if you got a low mark in math? (not at all upset/very upset)

Value of Math

Construct created by computing the mean of the following scales:

Interest in Math.

Importance of Math.

Advanced Utility of Math.

Value of Effort Spent on Math.

Table 1 (continued)

Ability Required to Do Well in Math

8. How smart does one have to be to do well in advanced high school math (like Advanced Algebra or Calculus)? (average in brightness/extremely bright)

23. How smart does one have to be to do well in basic math? (average in smartness/very smart)

Utility of Math for Women

12. How useful do you think that women find advanced high school math in their jobs? (not at all useful/very useful)

Utility of Math for Men

S1. How useful do you think men find advanced high school math (like Advanced Algebra and Calculus) in their jobs? (not at all useful/very useful)

Stereotyping Math as a Male Domain

The difference between the utility of math for men and the utility of math for women

Sex Stereotyping of Math Ability*

29. In general, I think boys are...
a) much better than girls at math, b)somewhat better than girls at math, c) a little better than girls at math, d) the same as girls at math, e) a little worse than girls at math, f) somewhat worse than girls at math, g) much worse than girls at math.

Table 2

ENGLISH ATTITUDE SCALES INCLUDED IN THE STUDENT QUESTIONNAIRE

Current Difficulty in English

18. Compared to most other subjects that you take, how hard is English for you? (my easiest course/my hardest course)

Effort Required to do Well in English

2. How hard do you have to try to get good grades in English? (not at all hard/very hard)

Perception of Task Difficulty

Construct created by computing the mean of the following scales:

Current Difficulty in English.

Effort Required to do Well in English.

Current Expectancies in English

3. Compared to other students in you class, how well do you expect to do in English this year? (much worse than other students/much better than other students)

Perception of English Ability

6. If you were to order all the students in your English class from the worst to the best in English, where would you put yourself? (the worst/the best)

Estimated Performance in English

10. In English, most of the time, how well do you do in each of the following things?
    10a) When the teacher calls on you for an answer in class. . . (very poorly/very well)
    10b) When taking a test I have studied hard for. . . (very poorly/very well)
    10c) When doing English homework problems . . . (very poorly/very well)

Table 2 (continued)

Self Concept of English Ability

Construct created by computing the mean of the following scales:

Current Expectancies in English.

Future Expectancies in English.

Perception of English.

Ability Estimated Performance in English.

Interest in English

4. In general, I find working on English assignments: (very boring/very interesting)

11. How much do you like English? (not very much/very much)

Importance of English

8. In general, how important is it to you to be good at reading and writing? (not at all important/very important)

19. In general, how important is it to you to be good at creative writing and understanding English literature? (not at all important/very important)

Value of English

Construct created by computing the mean of the following scales:

Interest in English.

Importance of English.

Utility of English.

Table 3

Mean Responses on Measures of Sex Role

Identity and Stereotyping for Males and Females

	Females	Males
Femininity score on PAQ	4.06	3.79
Masculinity score on PAQ	3.66	3.87
Frequency of engaging in feminine stereotyped activities	3.60	2.49
Frequency of engaging in masculine stereotyped activities	3.32	4.17
Importance of boys to engage in feminine activities	4.06	3.72
Importance of boys to engage in masculine activities	4.96	5.15
Importance of girls to engage in feminine activities	4.96	5.14
Importance of girls to engage in masculine activities	4.04	3.39
N	533	518

Note: All sex differences significant at p .01.

Table 4

Mean Values for Attitudinal Scales on Math and English for Males and Females in Grades 5 Through 12

	Mathematics		English	
	Females	Males	Females	Males
Current difficulty	3.93	3.61 **	3.31	3.77 **
Required effort	4.98	4.84	4.27	4.67 **
Actual Effort	4.59	4.34 **		
Cost of doing well	3.14	2.91 *		
Perception of task difficulty	4.50	4.27 **	3.89	4.30 **
Current expectancies	5.02	5.25 **	5.44	5.17 **
Perception of ability	4.78	5.04 **	5.21	4.99 *
Estimated performance	5.21	5.23	5.69	5.44 **
Self concept of ability	4.97	5.18 **	5.41	5.15
Interest	4.72	4.62	4.51	3.79 **
Importance	5.81	5.77	6.16	5.80 **
Value	5.10	5.15	5.25	4.82 **
Ability required to do well in math	3.66	3.67		
Stereotyping math as a male domain	.90	1.09		
Stereotype of math ability	3.93	4.25 **		
N	545	525	530	522

**Sex difference signigicant at p<.001

* Sex difference significant at p<.01

Note: Some attitudes were asked only about mathematics.

Table [illegible]

Mean Values for Scales of Attitudes Toward Math for Males and Females for all Significant Differences Across Sex Roles as Measured by the PAQ and Activity Rating Scales

	Females			Males		
	PAQ	Self rating on activity scale	Idealized girl rating on activity scale	PAQ	Self rating on activity scale	Idealized boy rating on activity scale
Current difficulty in math	M 3.56**				M 3.44**	
	[illegible] 3.74				[illegible] 3.67	
	[illegible]				A 3.7[illegible]	
	F 4.09				F 4.39	
Effort required to do well in math	M 4.7[illegible]				M 4.72	
	[illegible] 4.8[illegible]				[illegible] 4.7[illegible]	
	A [illegible]				[illegible] 5.05	
	F 5.[illegible]				A 5.09	
[illegible] in math	A 2.89*			F 2.72*	F 2.81*	
	M [illegible]			M [illegible]	M [illegible]	
	F [illegible]			A 2.88	A 2.96	
	[illegible]			[illegible] 3.16	F 3.64	
Perception of task difficulty	M 4.2[illegible]				M 4.12*	
	[illegible] 4.47				M 4.27	
	C 4.48				A 4.45	
	F 4.66				F 4.59	

Table 5 (continued)

Mean Values for Scales of Attitudes Toward Math for Males and Females for all Significant Differences Across Sex Roles as Measured by the PAQ and Activity Rating Scales

	Females			Males		
	PAQ	Self rating on activity scale	Idealized girl rating on activity scale	PAQ	Self rating on activity scale	Idealized boy rating on activity scale
Current expectancies in math	U 4.72***		M 4.81*	U 4.91***	F 4.72**	U 5.01*
	F 4.78		F 4.95	F 5.10	U 5.09	F 5.24
	M 5.08		U 5.06	M 5.34	A 5.23	M 5.27
	A 5.50		A 5.15	A 5.50	M 5.41	A 5.42
Perception of math ability	U 4.57***		M 4.55**	U 4.82**	F 4.33**	
	F 4.63		F 4.67	F 4.73	U 4.95	
	M 4.80		U 4.83	A 5.14	A 4.98	
	A 5.13		A 4.94	M 5.19	M 5.17	
Estimated performance in math	U 4.89***			U 4.85***		
	F 5.12			F 5.06		
	M 5.26			M 5.34		
	A 5.57			A 5.48		
Self concept of math ability	U 4.70***		M 4.80*	U 4.85***	F 4.62*	
	F 4.80		F 4.84	F 5.01	U 5.08	
	M 5.03		U 5.00	M 5.29	A 5.17	
	A 5.37		A 5.11	A 5.38	M 5.28	

Table 5 (continued)

Mean Values for Scales of Attitudes Toward Math for Males and Females for all Significant Differences Across Sex Roles as Measured by the PAQ and Activity Rating Scales

	Females			Males		
	PAQ	Self rating on activity scale	Idealized girl rating on activity scale	PAQ	Self rating on activity scale	Idealized boy rating on activity scale
Interest in math	U 4.44***	F 4.59*	M 4.46**	U 4.26**	F 3.76***	U 4.15***
	F 4.54	U 4.64	F 4.53	F 4.63	U 4.36	M 4.65
	M 4.81	M 4.76	U 4.71	M 4.67	M 4.75	F 4.70
	A 5.15	A 4.97	A 4.96	A 4.85	A 4.75	A 4.88
Importance of math	U 5.56***		M 5.54***	U 5.51**		U 5.52***
	M 5.64		U 5.60	F 5.66		M 5.70
	F 5.76		F 5.69	M 5.82		F 5.80
	A 6.18		A 6.12	A 5.96		A 6.02
Value of math	U 4.84***	F 4.95***	F 4.91***	U 4.84***		U 4.87***
	F 4.97	U 5.07	M 4.94	F 5.16		M 5.09
	M 5.13	M 5.24	U 4.97	M 5.19		F 5.21
	A 5.48	A 5.36	A 5.34	A 5.36		A 5.39
Abilty required to do well in math	U 3.48*	F 3.51*	U 3.21 ***			F 3.41 *
	M 3.49	M 3.69	M 3.49			U 3.54
	F 3.64	U 3.70	F 3.74			M 3.67
	A 3.86	A 3.87	A 3.91			A 3.83

Table 5 (continued)

Mean Values for Scales of Attitudes Toward Math for Males and Females for all Significant Differences Across Sex Roles as Measured by the PAQ and Activity Rating Scales

	Females			Males		
	PAQ	Self rating on activity scale	Idealized girl rating on activity scale	PAQ	Self rating on activity scale	Idealized boy rating on activity scale
Stereotyping math as male domain		M .11**				
		A .65				
		U 1.07				
		F 1.09				
Stereotyping of math ability					A 4.06*	U 4.10**
					F 4.17	F 4.13
					U 4.28	A 4.17
					M 4.34	M 4.48
N	U 137	U 88	U 103	U 132	U 134	U 126
	F 162	F 260	F 72	F 54	F 18	F 70
	M 73	M 32	M 138	M 189	M 231	M 160
	A 161	A 161	A 222	A 140	A 137	A 159

* p .05

** p .01

*** p .001

Note: Sex role classifications were derived using the median split method. In this table these groups are identified as U (undifferentiated), F (feminine), M (masculine), and A (androgynous).

Table 6

Mean Values for Scales of Attitudes Toward English for Males and Females for all Significant Differences Across Sex Roles as Measured by the PAQ and Activity Rating Scales

	Females			Males		
	PAQ	Self rating on activity scale	Idealized girl rating on activity scale	PAQ	Self rating on activity scale	Idealized boy rating on activitiy scale
Current difficulty in English	A 3.06**					
	F 3.22					
	M 3.41					
	U 3.69					
Perception of task difficulty	F 3.69 *					
	A 3.78					
	M 4.00					
	U 4.21					
Current expectations in English	U 5.10 ***			F 4.76***		M 4.90**
	M 5.32			U 4.90		U 5.10
	F 5.41			M 5.25		A 5.37
	A 5.83			A 5.46		F 5.43
Perception of English ability	U 4.90 ***			F 4.55 ***		
	M 5.10			U 4.78		
	F 5.12			M 5.09		
	A 5.61			A 5.21		

Table 6 (continued)

Mean Values for Scales of Attitudes Toward English for Males and Females for all Significant Differences Across Sex Roles as Measured by the PAQ and Activity Rating Scales

	Females			Males		
	PAQ	Self rating on activity scale	Idealized girl rating on activity scale	PAQ	Self rating on activity scale	Idealized boy rating on activity scale
Estimated performance in English	U 5.36***			U 5.00***	F 4.89**	M 5.27**
	F 5.56			F 5.44	U 5.21	U 5.37
	M 5.75			M 5.54	M 5.45	F 5.37
	A 6.07			A 5.70	A 5.70	A 5.67
Self concept of English ability	U 5.08***			U 4.85***		M 4.95*
	F 5.32			F 4.87		U 5.14
	M 5.38			M 5.21		F 5.23
	A 5.81			A 5.45		A 5.32
Interest in English	U 4.17***			U 3.46***		M 3.44**
	M 4.33			M 3.63		U 3.67
	F 4.44			F 3.76		F 4.02
	A 5.00			A 4.31		A 4.11
Importance of English	U 5.88***			U 5.52**		U 5.58**
	M 6.01			M 5.80		F 5.72
	F 6.08			F 5.82		M 5.73
	A 6.51			A 6.05		A 6.10

Table 6 (continued)

Mean Values for Scales of Attitudes Toward English for Males and Females for all Significant Differences Across Sex Roles as Measured by the PAQ and Activity Rating Scales

	Females			Males		
	PAQ	Self rating on activity scale	Idealized girl rating on activity scale	PAQ	Self rating on activity scale	Idealized boy rating on activity scale
Value of English	U 4.97***		U 5.05*	U 4.44***		U 4.61**
	M 5.08		F 5.14	F 4.81		M 4.61
	F 5.15		M 5.19	M 4.82		M 5.00
	A 5.71		A 5.42	A 5.18		A 5.12
N	U 136	U 152	U 103	U 134	U 131	U 127
	F 162	F 142	F 71	F 54	F 18	F 70
	M 73	M 73	M 138	M 190	M 229	M 162
	A 160	A 163	A 218	A 141	A 136	A 161

* p .05

** p .01

*** p .001

Note: Sex role classifications were derived using the median split method. In this table these groups are identified as U (undifferentiated), F (feminine), M (masculine), and A (androgynous).

Modified PAQ Given to 5th-8th Graders

Now we would like to know what kind of person you think you are. Listed below are words that can be used to describe a person. For each set of words or phrases, circle the number that best describes you. For example:

not at all nice	1	2	3	4	5	very nice

If you feel you are very nice you would circle 5. If you feel you are not at all nice, circle 1. If you are nice most of the time, circle 4. Do not circle more than one number on a line.

Scale Component							
Masculine	1. Not able to work alone	1	2	3	4	5	Always work by myself
Masculine	2. Not at all active	1	2	3	4	5	Very active
Feminine	3. Very rough	1	2	3	4	5	Very gentle
Feminine	4. Not at all helpful to others	1	2	3	4	5	Very helpful to others
Feminine	5. Not at all kind	1	2	3	4	5	Very kind
Feminine	6. Not at all aware of feelings of others	1	2	3	4	5	Very aware of feelings of others
Masculine (reversed)	7. Can make up my mind very easily	1	2	3	4	5	Have very hard time making up my mind
Masculine	8. Give up easily	1	2	3	4	5	Never give up easily
Masculine	9. Not at all sure of myself	1	2	3	4	5	Very sure of myself
Masculine	10. Feel I'm not as good as other people	1	2	3	4	5	Feel I'm better than other people
Feminine	11. Not at all understanding of others	1	2	3	4	5	Very understanding of others
Feminine	12. Very unfriendly toward people	1	2	3	4	5	Very friendly toward people

Modified PAQ Given to 9th-12th Graders

Now we would like to know what kind of person you think you are. Listed below are words that can be used to describe a person. For each set of words or phrases, circle the number that best describes you.

For example:

not at all nice 1 2 3 4 5 very nice

If you feel you are very nice you would circle 5. If you feel you are not at all nice, circle 1. If you are nice most of the time, circle 4. Do not circle more than one number on a line.

Scale Component				
Masculine	1. Not at all independent	1 2 3 4 5	Very independent	2:48
	2. Not at all emotional	1 2 3 4 5	Very emotional	2:49
Masculine	3. Not at all active	1 2 3 4 5	Very active	2:50
Feminine	4. Very rough	1 2 3 4 5	Very gentle	2:51
Feminine	5. Not at all helpful to others	1 2 3 4 5	Very helpful to others	2:52
	6. Not at all competitive	1 2 3 4 5	Very competitive	2:53
Feminine	7. Not at all kind	1 2 3 4 5	Very kind	2:54
Feminine	8. Not at all aware of feelings of others	1 2 3 4 5	Very aware of feelings of others	2:55
Masculine (reversed)	9. Can make decisions easily	1 2 3 4 5	Have difficulty making decisions	2:56
Masculine	10. Give up easily	1 2 3 4 5	Never give up easily	2:57
Masculine	11. Not at all sure of myself	1 2 3 4 5	Very sure of myself	2:58
Masculine	12. Feel very inferior	1 2 3 4 5	Feel very superior	2:59
Feminine	13. Not at all understanding of others	1 2 3 4 5	Very understanding of others	2:60
Feminine	14. Very cold toward people	1 2 3 4 5	Very warm toward people	2:61

Self Rating Activity Scale

As a person you do a lot of different things. Some things you do more often than others. For each activity listed below, circle the number which best indicates how often you do this activity. Circle 1 if you rarely or never do the activity. Circle a 2 if you do the activity only very occasionally. Circle a 3 or 4 if you do the activity often to fairly often. Circle a 5 if you do the activity quite regularly. Circle a 6 if you do it very often.

Scale Component			never					very often	
Fem.	1.	Spend time making yourself look attractive	1	2	3	4	5	6	2:10
Masc.	2.	Fix things around the house	1	2	3	4	5	6	2:11
Fem.	3.	Learn new dances	1	2	3	4	5	6	2:12
Fem.	4.	Take care of a baby	1	2	3	4	5	6	2:13
Masc.	5.	Shovel snow off the sidewalk	1	2	3	4	5	6	2:14
Masc.	6.	Play active sports	1	2	3	4	5	6	2:15
Fem.	7.	Help wash the dishes	1	2	3	4	5	6	2:16
Masc.	8.	Fish and hunt	1	2	3	4	5	6	2:17

Idealized Girl Activity Scale

As a person, you engage in a lot of different activities. What you do and what you don't do may change how well you are liked by friends, parents, and teachers, how much fun you have, how well prepared you are for the future and how good you feel about yourself. Listed below are things that people may do. Some do more often than others. Some of the things boys are more likely to do ...er of the things, girls are more likely to do. Rate each activity acc... ...w important you think it is for girls to know how to do and do each of the...

1. How important is it for a girl to spend time making herself look attractive?

not very important					very important		
1	2	3	4	5	6	7	2:18

2. How important is it for a girl to fix things around the house?

not very important					very important		
1	2	3	4	5	6	7	2:19

3. How important is it for a girl to enjoy learning new dances?

not very important					very important		
1	2	3	4	5	6	7	2:20

4. How important is it for a girl to know how to take care of a baby?

not very important					very important		
1	2	3	4	5	6	7	2:21

5. How important is it for a girl to offer to help shovel snow off the sidewalk?

not very important					very important		
1	2	3	4	5	6	7	2:22

6. How important is it for a girl to enjoy playing active sports?

not very important					very important		
1	2	3	4	5	6	7	2:23

7. How important is it for a girl to offer to help wash the dishes?

not very important					very important		
1	2	3	4	5	6	7	2:24

8. How important is it for a girl to enjoy fishing and hunting?

not very important					very important		
1	2	3	4	5	6	7	2:25

Idealized Boy Activity Scale

As a person, you engage in a lot of different activities. What you do and what you don't do may change how well you are liked by friends, parents, and teachers, how much fun you have, how well prepared you are for the future and how good you feel about yourself. Listed below are things that people may do. Some they do more often than others. Some of the things boys are more likely to do while other of the things, girls are more likely to do. Rate each activity according to how important you think it is for boys to know how to do and do each of these things.

1. How important is it for a boy to spend time making himself look attractive?

not very important					very important		
1	2	3	4	5	6	7	2:26

2. How important is it for a boy to fix things around the house?

not very important					very important		
1	2	3	4	5	6	7	2:27

3. How important is it for a boy to enjoy learning new dances?

not very important					very important		
1	2	3	4	5	6	7	2:28

4. How important is it for a boy to know how to take care of a baby?

not very important					very important		
1	2	3	4	5	6	7	2:29

5. How important is it for a boy to offer to help shovel snow off the sidewalk?

not very important					very important		
1	2	3	4	5	6	7	2:30

6. How important is it for a boy to enjoy playing active sports?

not very important					very important		
1	2	3	4	5	6	7	2:31

7. How important is it for a boy to offer to help wash the dishes?

not very important					very important		
1	2	3	4	5	6	7	2:32

8. How important is it for a boy to enjoy fishing and hunting?

not very important					very important		
1	2	3	4	5	6	7	2:33